

THE GENERA *LACCOBIUS* AND *NOTHYDRUS* (COLEOPTERA, HYDROPHILIDAE) IN AUSTRALIA AND NEW ZEALAND

by ELIO GENTILI

Musco del Seminario, Venegono Inf., 21040, Italy.

Abstract

GENTILI, Elio. 1980. The genera *Laccobius* and *Nothydrus* (Coleoptera: Hydrophilidae) in Australia and New Zealand. *Rec. S. Aust. Mus.* 18 (7): 143-154.

A key to the Australian and New Zealand genera of the water beetle family Hydrophilidae, subfamily Hydrobiinae, tribe Hydrobiini, subtribe Hydrobiae is given and the Australian and New Zealand species of *Laccobius* Erichson, 1837 and *Nothydrus* Balfour-Browne, 1939 are described or redescribed and figured. *Laccobius* is represented in Australia by the species *L. (Notoberosus) zietzi* (Blackburn, 1895). *L. (Platylaccobius) clarus* n.sp., *L. (Platylaccobius) decipiens* n.sp., *L. (Macrolaccobius) marmoratus* Macleay, *L. (Macrolaccobius) matthewsi* n.sp., *L. (Macrolaccobius) bicaudatus* n.sp., *L. (Macrolaccobius) collum* n.sp., and *L. (Macrolaccobius) brittoni* n.sp., and in New Zealand by *L. (Platylaccobius) arrowi* d'Orchymont, 1925. *Nothydrus* is found only in Australia where it is represented by *N. australis* (Blackburn, 1891) and *N. montanus* (Blackburn, 1891). The differences between *Nothydrus* and *Laccobius* are discussed and other genera to which *Nothydrus* may be closely related are noted.

INTRODUCTION

Members of the genera *Laccobius* and *Nothydrus* are aquatic Coleoptera found in both stagnant and running freshwater. The first genus is widespread, being absent only from South America, the second is Australian. They belong to the family Hydrophilidae, subfamily Hydrobiinae, tribe Hydrobiini, subtribe Hydrobiae (see d'Orchymont 1942).

The genera of Hydrobiae d'Orchymont, 1919, in Australia and New Zealand may be distinguished by the following key.

Key to Australian and New Zealand Hydrobiae

1. Hind trochanters with an elongate apex and separated from the femora at their tip. Elytra without parasutural furrows. Six abdominal segments, the sixth somewhat retractile into the fifth. *Laccobius* Erichson, 1837
- Hind trochanters not elongate. Elytra with parasutural furrows. Five abdominal segments 2
2. (1) Regular longitudinal lines of punctures on elytra. Antennae 9-segmented. Meso- and meta-tarsi with the first article shorter than second. Larger body size: length more than 4 mm. 3
- Elytral punctures not, or only on hind and lateral surface, arranged in longitudinal lines but randomly disposed. Antennae 7-9 segmented. Size normally less than 4 mm 5

3. (2) Meso- and meta-tarsi without long swimming setae. Meso- and meta-femora without hydrofugal hairs. Body posteriorly enlarged . . . *Hybognathus* d'Orchymont, 1942.
- Upperside of meso- and meta-tarsi with long swimming setae. Meso- and meta-femora with hydrofugal hairs . . . 4
4. (3) Pro-, meso-, and anteriorly meta-sternum keel-shaped in the middle *Limnoxenus* Motschulsky, 1853
- Only the mesosternum sometimes keel-shaped in the middle *Hydrobius* Leach, 1815
5. (4) Prosternum keel-shaped in the middle. Hind femora without dense hydrofugal hairs. *Paracymus* Thomson, 1867
- Prosternum without any longitudinal keel. Hind femora, at least anteriorly, with dense hydrofugal hairs. 6
6. (5) Labium deeply excavated. Fifth antennal article cupuliform. Elytral rows posteriorly conspicuous *Nothydrus* Balfour-Browne, 1939
- Labium anteriorly not excavated. Elytra without longitudinal rows of punctures. Fifth antennal article normally shaped *Anacaena* Thomson, 1859

SYSTEMATICS

The genus *Laccobius* is recognizable chiefly by the following features. A convex, oval body, not capable of rolling up. Head with a Y-shaped suture and entire eyes; sometimes the male with two specula under the labium; antenna 8-segmented (5+3), the fifth article asymmetrically cup-shaped; maxillary palpi shorter than antennae, with penultimate article shorter than ultimate. Pronotum without furrows or keels; prosternum keel-shaped in the middle; anterior tarsi expanded in the male. Scutellum a subequilateral triangle; mesosternum usually with a longitudinal keel and a small tooth in front of the keel; middle femora without hydrofugal hairs (sometimes these are represented by a small basal tuft, but not in Australian specimens); elytra, as a rule (and always in Australian species), without parasutural furrows. Wings provided with cantharidiform nervation. Metasternum without any keel, in the middle with a small glabrous area; hind trochanters with an elongate apex and separated from the femora at their tip; hind femora without hydrofugal hairs; hind tibiae usually curved. Six abdominal segments, without any keel; the sixth somewhat retractile into the fifth. Pro-, mid- and hind tarsi with the first article shorter than the second, and the last shorter than the others combined.

The subgenera in our region are the following:

1. *Notoberosus* Blackburn, 1895 (syn. n. : *Ortholaccobius* Ganglbauer, 1904). It has straight hind tibiae. This feature is also

typical of the subgenus *Ortholaccobius* Ganglbauer, 1904; the two subgenera, in my opinion, are to be united. The differences are chiefly two, both in the male of *zietzi* (*Notoberosus*): the specula and the lack of a mesoternal keel. These differences disappear in the female, and are therefore inadequate to form the basis for the separation of two subgenera. *Notoberosus* are very numerous in New Guinea and in surrounding islands. The other three subgenera have curved hind tibiae.

II. *Microlaccobius* Gentili, 1974 is characterized by the pattern of the elytral series, alternately more regular, more impressed, more punctate, and less regular, less impressed, less punctate. The subgenus appears to be the most primitive, owing to lack of specula, and to the small, weakly chitinized and simply structured aedeagus.

III. *Macrolaccobius* Gentili, 1974 is, like the preceding, a subgenus widespread in the Palaearctic, and Oriental regions. It has more complex features: the elytral series more irregular, an evolved aedeagus, and sometimes specula and tufts of hairs on the middle femora.

IV. *Platylaccobius* Gentili, 1974 is characterized by the lack or reduction of the elytral seriation. The body is normally flat, more so than in *Micro*- and *Macrolaccobius*, and the aedeagus more complex than in *Microlaccobius*.

Key to species

1. Hind tibiae straight: subg. *Notoberosus* ... *zietzi* Blackburn
Hind tibiae curved 2
2. (1) Elytral punctures randomly placed and not forming any pattern of rows or lines, rarely in sparse and incomplete lines, rows or whorls subg. *Platylaccobius* 3
Elytral punctures in about 20 longitudinal curved lines. 5
3. (2) Pronotum without a dark spot, or the dark spot is very feeble and indistinct; aedeagus as in Fig. 2 a, b *clarus* n. sp.
A distinct dark spot on the pronotum 4
4. (3) Body length twice (or more than twice) the breadth.
Australian species. Aedeagus as in Fig. 2 c, d
decipiens n. sp.
Body length less than twice the breadth. New Zealand species. Aedeagus as in Fig. 3 a, b ... *arrowi* d'Orchymont
5. (2) Elytral punctures alternately (in primary series) more regular, more impressed and more punctate, and in secondary series, not regular, weakly impressed and scarcely punctate. Size small, subg. *Microlaccobius* ... 6
Elytral punctures are in series not so alternated; some of them are irregular, with mixed small and large punctures, subg. *Macrolaccobius* 7

6. (5) Labium extended posteriorly in the shape of a V reaching the postlabium; hind margin of propygidium deeply excised; aedeagus as in Fig. 4 a, b ... *marmoratus* MacLeay

Hind margin of the labium slightly sinuous medially; propygidium not excised; aedeagus as in Fig. 4 c, d
matthewsi n. sp.

7. (5) A large preocular patch. Hind apex of each elytron separated from the other, leaving a large triangular space between them *bicaudatus* n. sp.

No preocular patches. Hind apex of each elytron close to the other in resting position. Smaller body size 8

8. (7) Aedeagus wider, more complex, as in Fig. 5 a, b
collum n. sp.

Aedeagus narrower and simple, as in Fig. 5 c, d *brittoni* n. sp.

1. *Laccobius* (*Notoberosus*) *zietzi* (Blackburn 1895)
(Figs 1 a, b; 7)

Blackburn, 1895 (*Notoberosus*); Zaitzev, 1908 (*Notoberosus*); Knisch, 1924 (*Notoberosus*); d'Orchymont, 1925; 1937; 1948.

Body length 3.0-3.9 mm; breadth 1.35-1.75 mm. Elongated, more than twice as long as wide.

Labium dark or metallic, sometimes with pale sides, or entirely pale except in middle; surface alutaceous; anterior edge sinuous in male, straight in female, the posterior curved. Head dark or metallic, with large preocular patches reaching eyes; the patches sometimes united; surface very slightly alutaceous, with fine and scattered punctures. Eyes taken together scarcely smaller than intervening distance. Pronotum yellowish, sometimes reddish, or with some small evanescent dark spots in central area; smooth in male, hardly shagreened in female. Corners of pronotum rounded, the hind corners very widely so (more than in *minutus*). Scutellum pale or dark, with very thin punctures. Elytra yellowish, with or without a number of dark spots, but always pale on edges; the punctures are slightly darkened, numerous, irregularly scattered (but tending to form 5-6 series, chiefly near the suture), of various size. Elytral apex nearly vertical.

Underside dark, except head, pronotum, palpi, antennae and legs. Labium of male has two specula nearly circular in shape. The postlabium (or mentum) is rugose, its anterior margin sinuous. Prosternum short, keel-shaped; mesosternum weakly but distinctly keel-shaped in female, gibbous in male, the keel not anteriorly abrupt. Hind margin of fifth abdominal segment deeply sinuous in male. Antennae 8-segmented (Blackburn (1895) enumerated 6 segments); legs slender, the hind tibiae straight. Aedeagus (Fig. 1 a, b) 1/3-5 of body length; tegmen longer than parameres, which are rounded at apices; median lobe sulcate and pointed at apex.

South Australian species (Fig. 7), with the following distribution: Lake Callabonna (type locality, 10 ex., leg. A. Zietz); River Wakefield,

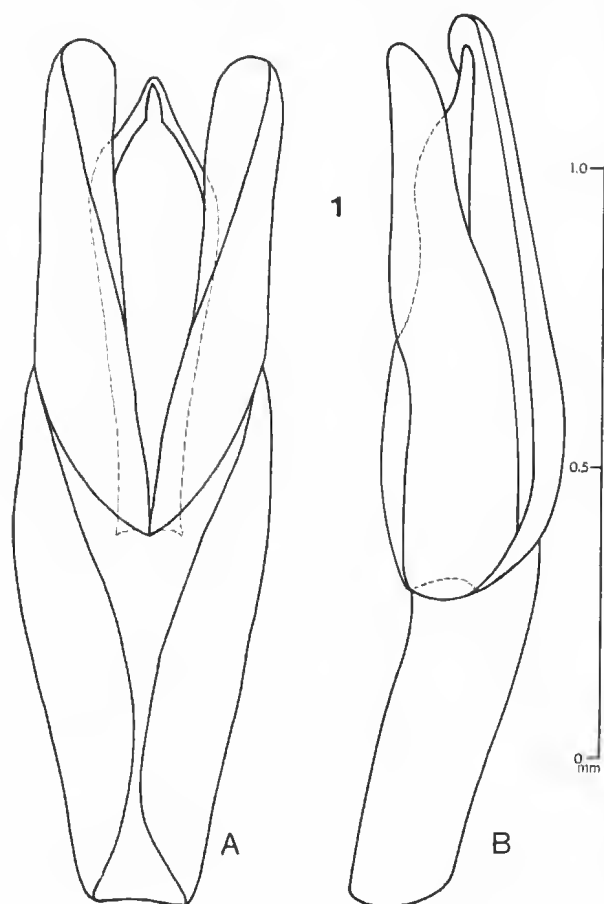


Fig. 1—Aedeagus of *Laccobius zietzi*, lectotype, Lake Callabonna, South Australia: A, frontal view, B, lateral view. Prepared in euparal, soluble in absolute alcohol, like the following aedeagi. The same scale applies to all of the text. Figures 1-6.

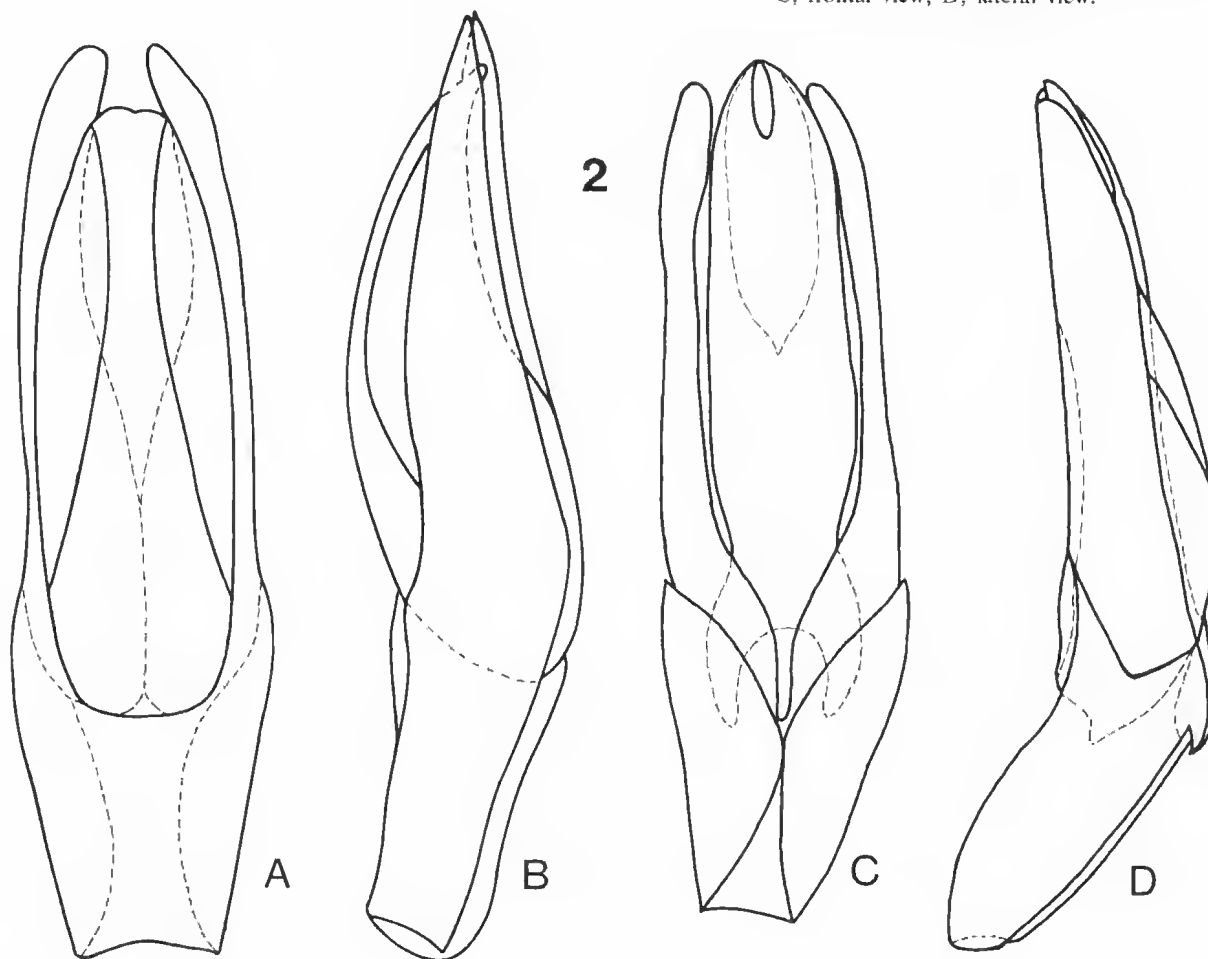
near Adelaide (2 ex.); Levi Creek, 6 km NW Big Perry Spring 28° 19' 2S, 136° 16' 1E (17 ex., leg. J. A. Herridge, 7.XII.1974); Coopers Creek, Ferry Crossing (1 ex., leg. J. A. Herridge, 30.XI.1974). The specimens are in the South Australian Museum, Adelaide, and in the Museums of Verona and Milano, Italy.

Lectotype: South Australian Museum, Adelaide; 3.4 x 1.55 mm; labels: L. Mulligan/L. Callabonna A. Zietz/9.6580 *Notoberosus zietzi* Blkb. L. Callabonna type /1. ♂ Paratypus 2. Lectotypus; *Laccobius* (*Notoberosus*) *zietzi* (Blackburn 1895); det. E. Gentili 1976. Another 7 specimens in the S.A. Museum labelled in the same manner as the lectotype are to be considered paratypes.

2. *Laccobius* (*Platylaccobius*) *clarus* n.sp.
(Figs. 2 a, b; 8)

Body length 2.4-3.1 mm; breadth 1.2-1.7 mm. Elongated, nearly twice as long as wide, very slightly convex.

Fig. 2—A, B, Aedeagus of *Laccobius clarus*, holotype, Adelaide, South Australia: A, frontal view, B, lateral view; C, D, Aedeagus of *Laccobius decipiens*, holotype, Tamworth, New South Wales: C, frontal view, D, lateral view.



Labium large, dark or metallic with pale angles, alutaceous, with anterior edge straight, the posterior curved. Head dark or metallic, with large preocular patches reaching eyes, the patches taken together are of the same width as intervening space, the whole surface shagreened and closely punctured. Prothorax testaceous, with a small evanescent dark spot in its central-anterior area; the surface shagreened and punctured like the head; fore margin sinuous, slightly prominent in centre (in *arrowi* it is straight). Scutellum pale or scarcely darkened, with a number of very thin punctures. Elytra pale, testaceous (sometimes darkened owing to 'actio post mortem'); the punctures are numerous, larger than those of pronotum, but similar to each other in size, irregularly scattered, darkened on elytral disc, clear at the edges; the humeri are conspicuous. Posterior apex ogival.

Underside dark, excepting head, pronotum, abdominal sides, palpi, antennae and legs. Postlabium flat, not rugose, with very fine punctures; the fore margin curved. Prosternum short (its length is $\frac{1}{2}$ that of the gula), keel-shaped. Mesosternum keel-shaped on its anterior $\frac{2}{3}$, with an anteriorly abrupt tooth on its fore apex. Hind margin of propygidium nearly straight in female, lightly curved in male. Palpi, antennae and legs of the normal pattern. Aedeagus (Fig. 2 a, b) $\frac{1}{10}$ of body length, with a large median lobe, shorter than parameres; the median lobe sometimes shows a small mobile strut near the apex.

The species is known from South Australia, New South Wales and Queensland (Fig. 8), and is among the commonest Australian *Laccobius*. South Australia: Adelaide (type locality, 11 ex., leg. T. Blackburn et al.); Hindmarsh Falls (2 ex., leg. E. B. Britton-N. Tindale, at light, 23-24.XII.1961); Well, near Oraparinna (1 ex., leg. G. F. Gross, at light, 12.II.1956); Karoonda to Peebinga (2 ex., leg. G. E. H. Wright); Murray River, E Adelaide (1 ex., leg. H. S. Cope); Frome River crossing of Birdsville Track, near Marree (4 ex., leg. G. F. Gross, at light, 25.X.1966); 10 km N Maynards Well, N Flinders Range (1 ex., leg. J. A. Herridge, at light, 11.XII.1974); Brachina Gorge, Flinders Range (6 ex., leg. J. A. Herridge, at light, 14.XII.1974); Muddle Bore, 35 km NE Billa Kalina (3 ex., leg. J. A. Herridge, at light, 4.XII.1974); Margaret River, 10 km SE Coward Springs (2 ex., leg. J. A. Herridge, at light, 3.XII.1974); Marree Racecourse (13 ex., leg. J. A. Herridge, at light, 1.XII.1974); Levi Creek, 8 km NW Big Parry Spring 28° 19' 2S, 136° 16' 1E (1 ex., leg. J. A. Herridge, at light, 7.XII.1974); Coopers Creek, Ferry Crossing (38 ex., leg. J. A. Herridge, at light, 30.XI.1974); 5.5 km WNW Myrtle Springs (1 ex., leg. E. G. Matthews, 2-3.III.1975); 37 km W of Anna Creek (1

ex., leg. E. G. Matthews, 8-9.III.1975); Coward Springs (1 ex., leg. G. F. Gross, at light, 9.XI.1966). New South Wales: Murray River, 50 mi. W of Wentworth (14 ex., leg. A. Neboiss 22.XI.1967). Queensland: Cunnamulla (1 ex., leg. H. Hardecastle); Dear River, 23° 13' S, 144° 04' E, 31 km NW by N of Longreach (3 ex., leg. M. S. Upton, 22.X.1975); Birdsville (4 ex., leg. J. Blyth, 11.V.1975). Australia (2 ex. Coll. Fairmaire; 2 ex. Pascoe Coll.).

Holotype: British Museum; 2.7 × 1.35 mm; labels: Australia; Adelaide /Sharp Coll. 1905-313 / *Laccobius* (*Platylaccobius*) *clarus* n. sp. E. Gentili det. 1976 / ♂ Holotypus.

Allotype: British Museum; 2.9 × 1.45 mm; similar labels. the Paratypes are those of the former list; they are in the following Natural History Museums: British Museum; Musée de Paris; Museo di Verona; Museo di Milano; South Australian Museum; CSIRO; National Museum of Victoria.

3. *Laccobius* (*Platylaccobius*) *decipiens* n. sp. (Fig. 2 c, d; 7)

d'Orchymont, 1925 (*L. marmoratus*).

Body length 2.9-3.9 mm; breadth 1.5-2.0 mm. Elongated, oval, nearly twice as long as wide.

Labium entirely dark or metallic, alutaceous, with a straight anterior margin. Head dark or metallic, with preocular patches reaching eyes, but somewhat smaller than in *clarus*; surface shagreened and closely punctured, the punctures more numerous and more impressed than in *clarus*. Pronotum pale, testaceous, with a dark spot longer than wide, reaching the fore margin more widely than the hind, and slightly expanded in the hind half; surface similar to that of head, shagreened and punctured; fore margin sinuous, slightly prominent in the centre. Scutellum dark. Elytra pale, sometimes with nebulous spots or darker lines (post mortem changes?); the punctures are scattered irregularly and very densely, sometimes suggesting longitudinal series. Apices of elytra ogival, but often the elytra are separated.

Underside dark, except antennae, palpi and most of legs, and sometimes borders of prothorax and abdomen. Labium without specula; postlabium flat, granulate. Prosternum keel-shaped; mesosternum keel-shaped on the hind $\frac{2}{3}$, with an anterior tooth on the keel. Hind margin of propygidium straight in both sexes. Palpi, antennae and legs of the normal pattern. Aedeagus (Fig. 2 c, d) ca. $\frac{1}{4}$ - $\frac{1}{7}$ of the body length, the median lobe somewhat narrower than in *clarus*, but slightly longer than the parameres.

The species is known from Victoria, New South Wales and Queensland (Fig. 7), and seems to be rarer than *clarus*. Victoria: Thurra River, Cape Everard (2 ex., leg. A. Neboiss, 22.III.1970); Deddick River, 7/8 km above Snowy R. junction (10 ex., leg. A. Neboiss, 13.XII.1976); Thomson River, 1 km upstream Cowwarr Wier (2 ex., leg. A. Neboiss, 26.X.1973); Snowy-Deddick River junction (1 ex., leg. A. Neboiss, 14.XII.1976); Snowy River, 5 km below Deddick River junction (1 ex., leg. A. Neboiss, 14.XII.1976); Rainbow Ck., Cowwarr—Scaton Rd., 18.II.1977, N.M.V. Survey Dept., GRES (1 ex.), New South Wales: Tamworth (type locality, 1 ex., leg. A.M. Lea); Jenolan Caves (14 ex., leg. J. C. Wiburd 1864); Volunla (1 ex., leg. J. Sedlacek, 1.1954); Tumut River (2 ex., leg. J. Sedlacek, 1955). Queensland: Cairns (1 ex., leg. J. Sedlacek 1951); N Queensland (3 ex., leg. T. Blackburn).

Holotype: Institut R. Sciences Naturelles de Belgique, Brussels; 3.5 × 1.75 mm; labels: Coll. R.I. Sc. N.B. Australia 1864 Tamworth N.S.W. Ex Coll. d'Orchymont/Coll. et det. d'A. Orchymont; *Notoberosus marmoratus* M.: R.M.H.N.B. 15.962/ *Laccobius* (*Platylaccobius*) *decipiens* n.sp. E. Gentili det. 1976 / ♂ holotypus.

The Paratypes are those of the former list; they are in the following Natural History Museums: South Australian Museum; National Museum of

Victoria; California Academy of Sciences; Bishop Museum, Honolulu; Museo di Verona; Museo di Milano.

4. *Laccobius* (*Platylaccobius*) *arrowi*

d'Orchymont, 1925

(Figs. 3 a, b; 7)

d'Orchymont, 1925; 1937; Winterbourn, 1970 (*mineralis*); 1973 (*mineralis*).

Body length 2.3–3.5 mm; breadth 2.2–1.7 mm. Oval, slightly convex, not much elongated (breadth less than half of length).

Labium dark or metallic, alutaceous, punctured, with fore margin straight, the hind curved. Head also dark or metallic, alutaceous, with fine scattered punctures; preocular patches pale and wide, as in *decipiens*. Pronotum dark on disc, pale on sides, the border of the colours uncertain; the dark spot is normally wider than in *decipiens*. Anterior margin of pronotum, between the lateral corners, almost straight (in contrast to *clarus* and *decipiens*); the surface alutaceous and punctured as on head. Scutellum dark. Elytra pale, sometimes darkened by post-mortem colour; the punctures are scattered, rarer than in *decipiens*, darkened on disc, pale on edges of elytra.

Underside dark, except palpi, antennae and most of legs (femora are for the most part darkened). Labium without specula; postlabium flat, with scarcely visible punctures. Prosteron keel-shaped; mesosternal keel with a tooth on fore end. Palpi, antennae and legs of normal pattern. Aedeagus (Fig. 3 a, b) 1/3 of body length, the median lobe shorter than parameres and very complex.

The species is known from New Zealand (Fig. 7): Otago, S Island (type locality, 10 ex., leg. Lewis 1901); Copland River, Welcome Flat, South Westland, S Island (Winterbourn, 1973); Rotorua Co., Waimangu Stream, N Island (4 ex., leg. K. A. J. Wise, 10.V.1971); Taupo, Waipuwera Stream, N Island (type locality of *mineralis*; 2 ex., leg. M. Winterbourn VI.1966; cfr. Winterbourn, 1970); Taupo, Waipahihi Stream, N Island (2 ex., cfr. Winterbourn, 1970); Waiotapu (Winterbourn, 1973); N. Swale (1 ex., of the British Museum). These specimens are in the British Museum, Brussels Museum, Auckland Museum and Verona Museum.

Holotype: British Museum; 2.75 × 1.5 mm; labels: Holotype/type/Otago Lewis 1901/A. d'Orchymont det. *Laccobius* s.str. *arrowi* d'Orchym./Sharp coll. 1905-313 (the anterior tarsi are all lost, but the description is of a male).

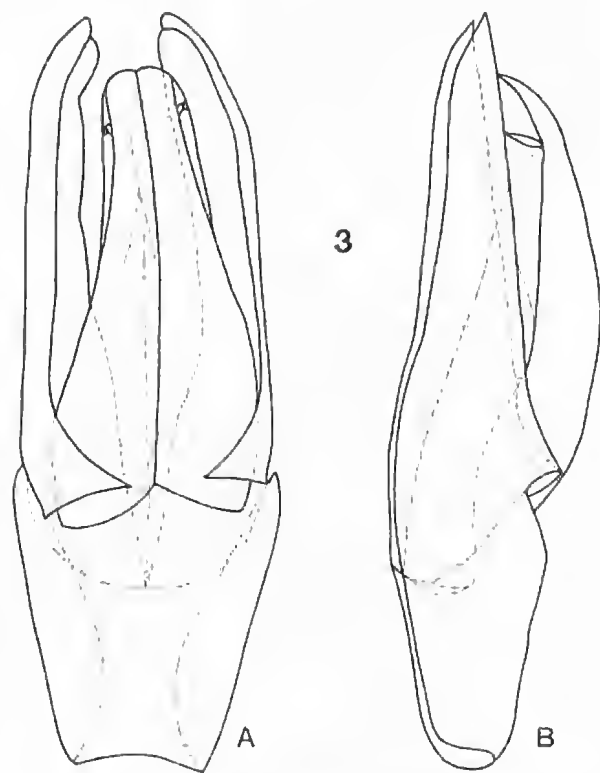


Fig. 3—Aedeagus of *Laccobius arrowi*, Rotorua Co., Waimangu Stream, N. Island, New Zealand: A, frontal view, B, lateral view.

Paratypes: I know of two paratypes from the type locality in the British Museum and in Brussels Museum.

Laccobius mineralis Winterbourn, 1970 is in my opinion the same species as *arrowi*. This opinion is based on the observation of both the typical specimens of *arrowi* and of one specimen from the type locality of *mineralis*, determined by Winterbourn and accompanied by 4 "*mineralis*" taken from the same area by K. A. J. Wise, as well as on the description of *mineralis*. These are the differential characters proposed by Winterbourn (1970): (1) The size: 2.3-2.4 mm for *arrowi*; 3.2-3.5 mm for *mineralis*. But I obtained, on 4 beetles from 4 different stations, these measurements: 2.65 x 1.35; 2.75 x 1.45; 2.95 x 1.5; 3.15 x 1.55 mm. They evidently are a continuous series. (2) The anterior angles of the pronotum are rounded in *arrowi*, and the pronotum is deeply curved anteriorly, while in *mineralis* the anterior angles are acute giving the anterior margin a sinuous appearance. This is really the same thing: the anterior angles are really rounded, but observed from above they appear acute; the sinuate appearance is due to the articulate corners that make the fore margin deeply curved. (3) The colour of the pronotum of *arrowi* is pale on the borders, of *mineralis* completely brown. Winterbourn observed possibly a melanic specimen. (4) The antennae are 8-segmented, not 6-segmented as observed by Winterbourn. The Holotype of *mineralis* is in the Auckland Institute and Museum, New Zealand.

5. *Laccobius* (*MicroLaccobius*) *marmoratus* (Macleay, 1873)
(Figs. 4 a, b; 7)

Macleay, 1873 (*Philhydrus*); Zaitzev, 1908 (*Enochrus*); Knisch, 1924 (*Enochrus*); cfr. d'Orchymont, 1925.

Body length 2.1-2.4 mm; breadth 1.1-1.3 mm. Elongated, oval, nearly twice as long as its width.

Anterior margin of labium arcuate. Labium and head dark, with a greenish metallic reflection; preocular pale patches before eyes are half the breadth of each eye. Surface (observed at 60 x) shagreened, without punctures. Ratio between breadth of eyes and of interposed space is $\frac{1}{2}$. Pronotum testaceous, with a dark metallic spot which reaches posterior but not anterior margin; this spot is narrower than space between eyes, and its fore border is divided into two parts. Surface shagreened more conspicuously than head, and with some impressed punctures on discal area. Scutellum alutaceous like the head, with very fine punctures. Elytra testaceous, with some dark nebosity on disc and paler edges; the series of punctures alternately more and less impressed.

Labium without specula, but with a border attached to the postlabium tracing a triangle. Postlabium flat, slightly wrinkled when observed at 60 x. Prosternum keel-shaped; mesosternal keel is pyramidal and present only on hind part of the mesosternum; glabrous metasternal line somewhat excavated. Hind margin of propygidium deeply excavated. Palpi, antennae and legs testaceous; the legs are normally shaped, elongated. Aedeagus $\frac{1}{4}$ of body length; ratio tegmen/parameres $\frac{2}{3}$; structure simple (fig. 4 a, b), the parameres scarcely longer than median lobe.

Lectotype: CSIRO, Canberra; 2.2 x 1.1 mm (elytra 1.45 mm); labels: Gayndah/On permanent loan from Macleay Museum, University of Sydney/*Laccobius marmoratus* (Macleay) ♂ Lectotypus E. Gentili 1975/syntype/*Philhydrus marmoratus*, MacL., Gayndah. Paratypes: The Australian Museum, Sydney; labels: red circular label/719509/*Philhydrus marmoratus* Mc. L. W. Gayndah the Holotype/1. Allolectotypus ♀ 2. Paratypus ♀ *Laccobius marmoratus* Macleay, E. Gentili 1976.

The species is known only from the type locality. Gayndah is a mountain town about 320 km north of Brisbane, Queensland (Fig. 7).

6. *Laccobius* (*MicroLaccobius*) *matthewsi* n.sp.
(Figs. 4 c, d; 8)

Body length 1.6-2.5 mm; breadth 0.9-1.35 mm, oval, moderately elongated, the length less than twice the width.

Head and labium dark metallic, with two yellowish preocular spots before the Y-shaped suture or, sometimes, before the eyes; these spots of same width as eyes or sometimes less. Surface clearly alutaceous and weakly punctured. Anterior border of labium regularly curved; distance between eyes more than width of eyes. Pronotum testaceous, with a dark or metallic central patch; the patch has uncertain borders and is normally larger anteriorly, reaching level of eyes. Surface shagreened like that of head, but with stronger punctures. Scutellum dark or metallic, micro-reticulated. Elytra testaceous, sometimes with a dark spot near centre of suture. The series of punctures are clearly alternating strongly impressed (primary), or weakly (secondary). Elytral apex rounded.

Underside dark; palpi, antennae and legs testaceous-yellowish. Labium without specula, the hind margin straight (in contrast with *marmoratus*). Prosternum keel-shaped; mesosternum with a keel on posterior part, the keel having an anterior tooth; propygidium posteriorly straight (another contrast to *marmoratus*). Aedeagus $\frac{1}{5}$ - $\frac{1}{4}$ of body length; parameres narrower than *marmoratus* in frontal view, and not narrowing out in apical part in lateral view (Fig. 4 c, d).

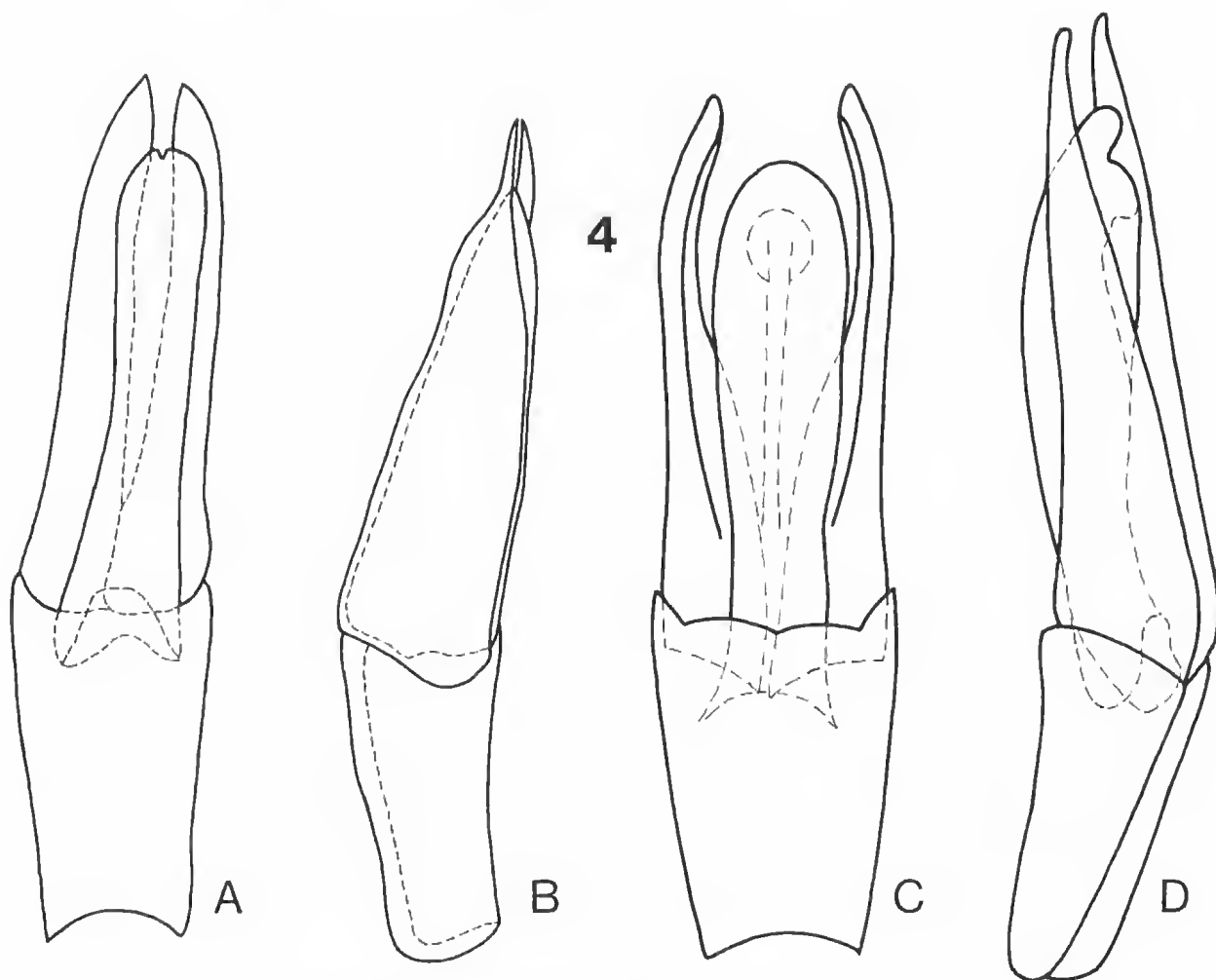


Fig. 4—A, B, Aedeagus of *Laccobius marmoratus*, lectotype, Gayndah, Queensland: A, frontal view, B, lateral view; C, D, Aedeagus of *Laccobius matthewsi*, holotype, Parachilna, Flinders Range, South Australia: C, frontal view, D, lateral view.

This is one of the more common *Laccobius* of Australia (Fig. 8). Western Australia: Mullewa (1 ex., leg. Harvard Exp. Darlington, 2.IX.1931); Carson Escarpment 14° 49' S, 126° 49' E (2 ex., leg. I.F.B. Common-M.S. Upton, 9-15.VIII.1975); Langi Crossing, 10 m (5 ex., leg. E.S. Ross-D.Q. Cavagnaro, 13.X.1962); Milly Milly, 300 m (1 ex., leg. E. S. Ross-D. Q. Cavagnaro, 6.X.1962); Northern Territory: Bessie Spring, 16° 40' S, 135° 51' E, 8 km ESE of Cape Crawford (7 ex., leg. M.S. Upton 26.X.1975); Nabarlek Dam, 12° 20' S, 133° 19' E, 15 km S by W of Nimbuwah Rock (1 ex., leg. E.G. Matthews, at light, 2.XI.1973); South Australia: Parachilna, Flinders Range (1 ex., type locality); Queensland: Coen, C. York (4 ex., leg. Harvard Exp. Darlington, V. 1932); Crystal Creek, 23 mi. SSE of Ingham, 18° 58' 5" S, 146° 16' E (7 ex., leg. Britton-Misko, at light, 9.XII.1968); Cairns Distr. (2 ex., leg. A.M. Lea); New South Wales: Moruya River, Araluen (9 ex., leg. E.B. Britton, 27.XII.1965); Manar Creek, Canberra Coast Road (1 ex., leg. E.B. Britton-S. Misko, 18.V.1967); Vicinity of Jenolan Caves (4 ex., leg. J. C. Wiburd);

Tumut River (1 ex., leg. J. Sedlacek, 1955); Victoria: Thurra River, Cape Everard (1 ex., leg. A. Neboiss, 22.III.1970); Deddick River, ½ km above Snowy River junction (4 ex., leg. A. Neboiss, 13.XII. 1976); Meredith (1 ex., leg. A. Neboiss, 12-13.II.1959); Eppalock Res. Redesdale (1 ex., leg. A. Neboiss, 27.XI. 1967).

Holotype: South Australian Museum, Adelaide; 2.3 × 1.25 mm; labels: Parachilna, Flinders Range / *Laccobius matthewsi* n.sp. E. Gentili 1976 / ♂ Holotypus.

Paratypes: those of the preceding list; they are in the following Museums: South Australian Museum; National Museum of Victoria; CSIRO; Museum of Comparative Zoology of the Harvard University; California Academy of Sciences; Bishop Museum, Honolulu; Museums of Verona and Milano, Italy.

7. *Laccobius* (*Macrolaccobius*) *bicaudatus* n.sp.

Body length 3.2 mm; breadth 1.5 mm; elongated, more than twice as long as wide.

Labium and head dark with metallic reflections; two pale patches as wide as eyes, situated before the latter; the whole surface shagreened, punctured, the punctures thicker and stronger behind lateral branches of Y-shaped suture. Fore margin of labium regularly arcuate. Pronotum pale, testaceous, the dark metallic spot oval, filling only central area of disc without reaching borders, the surface shagreened and punctured like vertex. Fore margin sinuous, with the median convexity equal to the lateral ones (these are scarcely developed, less than in other *Laccobius*). Elytra testaceous, hardly paler on apex and sides; the punctures without dark rings, the series not always conspicuous, more irregular on the apical zone. Elytral apices divergent.

Under side dark, except hind abdominal segments, palpi, antennae, legs, and to a certain extent the prosternum. Postlabium flat, shagreened and punctured; prosternum keel-shaped. The mesosternal keel ends anteriorly in an arrow-point, scarcely protruding. Hind border of fifth abdominal sternite scarcely arched, almost straight. Palpi short;

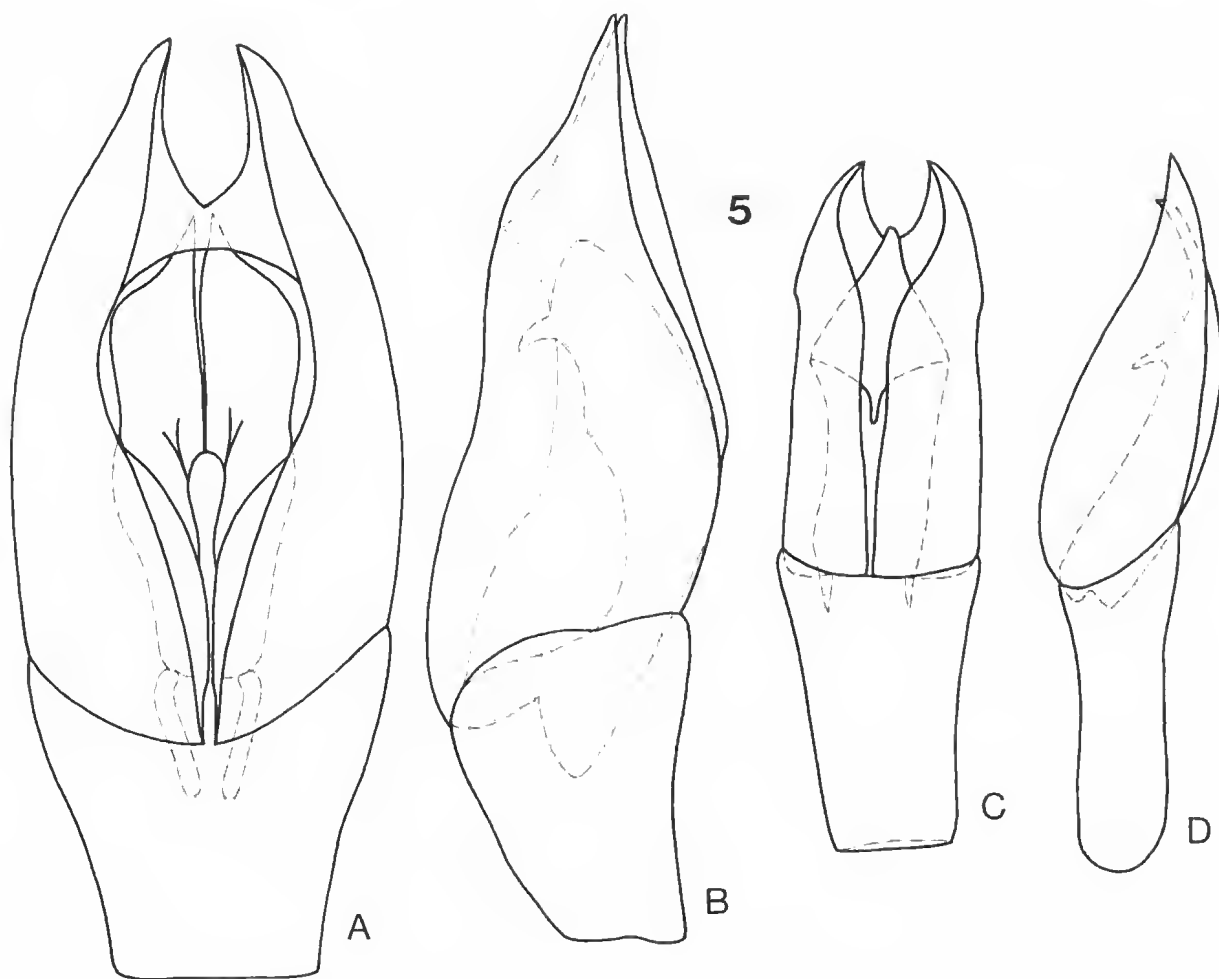
antennae much longer, legs elongated, normally shaped.

Holotype: Bishop Museum, Honolulu, Hawaii; it comes from the Northern Territory and is the only specimen known to me. Labels: Australia: N.T., Edith Ck., 2.XII.1963/J. Sedlacek Collector, Bishop Museum / E. Gentili det. 1977, *Laccobius bicaudatus* n.sp. / ♀ holotypus.

8. *Laccobius* (*Macrolaccobius*) *collium* n.sp.
(Figs. 5 a, b; 8)

Body length 2.3-2.4 mm; breadth 1.2-1.25 mm; oval, moderately elongated.

Dark, labium and head greenish-black, without preocular patches, micropunctured at 60 x, particularly in front of the Y-shaped suture; some larger punctures behind this suture. Labium and head large; fore margin of labium regularly arcuate; space between eyes broader than eyes as a whole.



Pronotum pale on the sides, the central patch greenish-black with uncertain borders, of the same width as space between eyes, hardly reaching fore and hind borders of pronotum at middle. Fore margin convex in middle; the hind also, but very little, on the scutellum. The whole surface smooth at 60 x, scarcely punctured. Scutellum dark, with metallic reflexes, sometimes finely punctured. Elytra testaceous, with some uncertain dark patches (one near middle of suture; another near base of elytron; a third between the others, but slightly external). Punctures darkened (except on sides and apex); the series are formed by punctures different in size, and alternately more and less regular. Suture angle of each elytron acute, approximate to the other elytron.

Underside dark, the abdomen sometimes lighter; palpi, antennae and legs testaceous. Labium without specula; postlabium flat or lightly undulated, with some impressed punctures, near the borders lightly wrinkled. Prosternum keel-shaped; mesosternum with a tubercle on posterior half; abdomen and legs normally shaped, the claws nearly straight. Aedeagus $\frac{1}{3}$ of body length; parameres appear to merge with each other; median lobe very complex (Fig. 5 a, b).

The typical series comes from the Northern Territory (Fig. 8). Holotype: CSIRO, Canberra; 2.3 x 1.2 mm; labels: Australia, 12° 31' S, 132° 54' E, 9 km N by E of Mudginbarry Hs., N.T., 10.VI.1973, Upton-Feehan/E. Gentili det. 1976. *Laccobius collum* n.sp./♂ Holotypus. Allotype and 4 Paratypes labelled in the same way; they are in the CSIRO and Verona Museums' Collections.

9. *Laccobius* (*Macrolaccobius*) *brittoni* n.sp.
(Figs. 5 c, d; 7)

Body length 2.2-2.4 mm; breadth 1.1-1.3 mm. Closely similar to *collum*; the chief difference is in the aedeagus, which is smaller, narrower, and with a simpler median lobe (Fig. 5 c, d); the ratio aedeagus/body length is about $\frac{1}{4}$. Externally, the sole difference appreciable is a greater convexity and a denser punctuation on the pronotum.

The species comes from Northern Australia (Fig. 7): Northern Territory: Bessie Springs, 16° 40' S, 135° 51' E, 8 km ESE of Cape Crawford (type locality, 4 ex., leg. M. S. Upton 26.X.1975); Nabarlek Dam, 12° 20' S, 133° 19' E, 15 km S by Nimbawah Rock (1 ex., leg. E. G. Matthews; 2.VI.1973); Queensland: Mary Creek, 16° 33' S, 145° 12' E (2 ex., leg. Britton-Misko, at light, 4.XII.1968).

Holotype: CSIRO, Canberra; 2.2 x 1.1 mm; labels: Australia, 16° 40' S, 135° 51' E, Bessie

Spring, 8 km ESE of Cape Crawford, 26.X.1975, M. S. Upton, N.T./E. Gentili det. 1976. *Laccobius brittoni* n.sp./♂ Holotypus.

Paratypes: the above list; they are in the CSIRO and Verona Museums' Collections.

THE BLACKBURN "*LACCOBIUS*" (*NOTHYDRUS* BALF.-BR., 1939, EMENDED)

Blackburn (1891) described two "*Laccobius*", *montanus* and *australis*, affirming that they "may be attributed to this genus . . . although they differ from the European members of it in having . . . characters . . . that may justify a new generic name". In effect, after the study of the typical females in the British Museum collections, Balfour-Browne (1939) proposed for these insects the new generic name "*Notohydrus*", emended by d'Orchymont (1942) to *Nothydrus*. I agree with these coleopterists; the differences from the nearer genera are in my opinion great enough to separate *Nothydrus* as an independent genus.

Nothydrus has chiefly the following characters. Labium shorter than in *Laccobius*, widely excavated anteriorly; prefrons flat, long, with a straight fore margin; upper surface of the head punctured. Postlabium plate-shaped. Antennae 8-segmented (5 + 3), the fifth article nearly cupuliform, like the *Cereyonini*; maxillary palpi robust, nearly as long as the antennae, the fourth article longer than the third. The fore margin of the pronotum is widely excavated for the reception of the head, the corners widely rounded, the surface punctured. The prosternum is lacking a keel. The fore femora are pubescent on the whole under surface, glabrous only near the apices; the fore tarsi do not show any sexual dimorphism. Scutellum nearly equilateral. Elytra with parasutural sulci on $\frac{1}{2}$ of their length, these sulci continuing anteriorly by means of some large punctures; the elytral punctures are scattered, but showing about ten series of larger punctures, more conspicuous and engraved on the hind surface; as in *Laccobius*, the epipleura are anteriorly large, and reduced on the posterior half of the elytron. The mesosternum is tuberculate, not sharply carinate. The mid femora are pubescent like the fore. The wings are present, provided with a cantharidiform nervation. The metasternum is pubescent, slightly elevated in the middle. The hind trochanters are small, not separated at their apices from the femora; these are almost entirely pubescent, save at the apices and sometimes the hind margin; the hind tibiae are straight; the fifth metatarsal segment is shorter than the four basal segments taken together. Five abdominal segments are visible, the sixth at rest is internal. The male sexual organs are similar to those of *Anacaena* in their general pattern.

The genus differs from *Laccobius* in having five abdominal segments, a prosternum without a keel, small hind trochanters not separated from the femora, pubescent femora, sexual dimorphism absent on fore tarsi, and a sutural stria on the elytra. From *Paracymus*, it differs in having the prosternum without any keel and the mesosternum without an arrow-head shaped keel. It differs from *Anacaena* in having an elongated and depressed body form, a deeply excavated labium, conspicuous elytral series, and a cupuliform fifth antennal article. In contrast to Balfour-Browne (1939), who suggested an affinity with *Laccobius*, placing the genus *Nothydrus* at the end of the subtribe Hydrobiae, d'Orchymont (1942) suggested an affinity with *Anacaena*. The pattern of the aedeagus (basis of the tegmen pointed; aedeagus flat, with a simple trilobate structure) confirms his opinion.

***Nothydrus australis* (Blackburn, 1891)**

(Fig. 6 a)

Blackburn, 1891 (*Laccobius*); Knisch, 1924 (*Laccobius*); Balfour-Browne, 1939 (*Nothydrus*); d'Orchymont, 1942.

Body length 2.9-3.5 mm; breadth 1.5-1.8 mm; oval elongated, less than twice as long as its width.

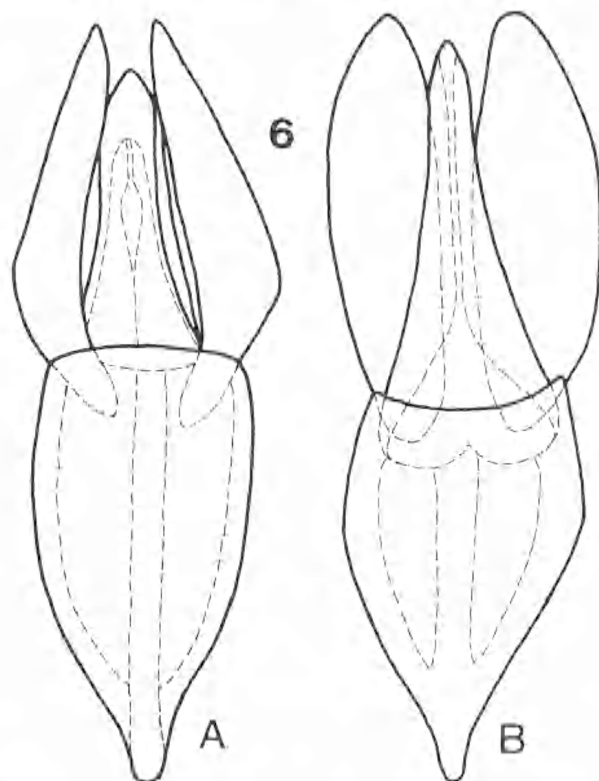


Fig. 6—A, Aedeagus of *Nothydrus australis*, Dondangdale, Victoria: frontal view; B, Aedeagus of *Nothydrus montanus*, Erica, Victoria: frontal view.

The beetle has the characters of the genus. It is enough to record here the differences from *montanus*. The dorsal colour is pale, testaceous,

only the discs of the head and of the pronotum being dark. The puncturation of the head and pronotum is finer and sparser than that of the elytra, while on the elytra the puncturation of the series is quite notably distinct from that of the general surface. The sides of the pronotum are not transparent. The greatest width is at the level of the middle of the elytra. The plate of the postlabium (flat, smooth, without punctures) and the sides of the abdomen are yellowish, the remainder of the under surface is dark. The hind femora are pubescent near the fore margin. Aedeagus nearly $\frac{1}{2}$ of the body length; tegmen longer than parameres; these are narrow and sharp at their apices like the median lobe (fig. 6 a).

Australia, Victoria; Ovens River (type locality, Blackburn, 1891); Bogong Village (1 ex., leg. A. Neboiss, 23.I.1960); Upper Nariel (6 ex., leg. A. Neboiss, 29.I.1957); Dondangdale (2 ex., leg. A. Neboiss, 11.I.1955); Marwall River (3 ex., leg. S. Trout, XII.1945); Sth. Neerim (1 ex., leg. F. E. Wilson 11.I.1941, det. A. d'Orchymont). These specimens are in the National Museum of Victoria, Melbourne, and in the Museum of Verona, Italy.

Holotype: British Museum; 3.0 × 1.5 mm; labels: T 3564 A1 / Holotype / Australia, Blackburn Coll., B. M. 1910-236 / *Laccobius australis* Blackb., *Laccobius australis* Blkb., M. E. Bacchus det. 1977, Holotype / *Nothydrus australis* Blackb., E. Gentili det. 1977.

***Nothydrus montanus* (Blackburn, 1891)**

(Fig. 6 b)

Blackburn, 1891 (*Laccobius*); Knisch, 1924 (*Laccobius*); Balfour-Browne, 1939 (*Nothydrus*); d'Orchymont, 1942.

Body length 3.5-4.5 mm; breadth 1.9-2.3 mm; larger than *australis* but like it in shape.

The chief differences from *australis* are the following. Dorsal colour darker, blackish-brown, more shining; apart from the preocular patches, only the sides of the pronotum are clear and transparent. The upper puncturation is the same on the head, pronotum and elytra, consisting of finer and sharper punctures than in *australis*, and it includes the punctures of the series, confusing the latter with those of the interseries. The greatest width is at the level of the base of the elytra. The plate of the postlabium (flat, without punctures, but slightly alutaceous) is pale, the remaining underside is dark. Hind femora pubescent at the bases. Aedeagus nearly $\frac{1}{2}$ of body length; tegmen long like the parameres, these larger than in *australis*, with rounded apices; the median lobe very wide at the base (Fig. 6 b).

Australia, Victoria; Victorian Mountains (type

locality, Blackburn, 1891); Bogong, High Plain (1 ex., leg. A. Neboiss, 26.I.1960); Erica (4 ex., leg. A. Neboiss, 29.I.1960); Millgrove (1 ex., leg. A. Neboiss, 26.III.1958); Cumberland Falls (1 ex., leg. A. Neboiss, 16.II.1958); Black's Spur (2 ex., leg. C. Oke, I.1934); Fern Tree Gully (1 ex., leg. C. Oke); New South Wales: Kosciusko (2 ex., leg. H. G. Carter). The specimens of this list are in the National Museum of Victoria, Melbourne, in the South Australian Museum, Adelaide, and in the Museum of Verona, Italy.

Holotype: British Museum; 3.6 × 1.85 mm; labels: Holotype / T 3563 Al. / Australia, Blackburn Coll., B. M. 1910-236 / *Laccobius montanus* Blackb. / *Laccobius montanus* Blkb., M. E. Bacchus det. 1977 Holotype / *Nothydrus montanus* Blackb. E. Gentili det. 1977.

ACKNOWLEDGEMENTS

I am indebted to the following colleagues and institutions for their generous assistance:

Dr. E. G. Matthews, South Australian Museum, Adelaide (Loan of material and revision of the manuscript).

Mr. M. E. Bacchus, and Mr. P. M. Hammond, British Museum, London.

Dr. A. Bons, and Dr. H. Perrin, Muséum National d'Histoire Naturelle, Paris.

Dr. E. B. Britton, CSIRO, Canberra.

Dr. A. A. Calder, National Museum of Victoria, Melbourne.

Mr. E. C. Dahms, The Queensland Museum, Fortitude Valley.

Dr. R. Damoiseau, Institut R. des Sciences Naturelles de Belgique, Bruxelles.

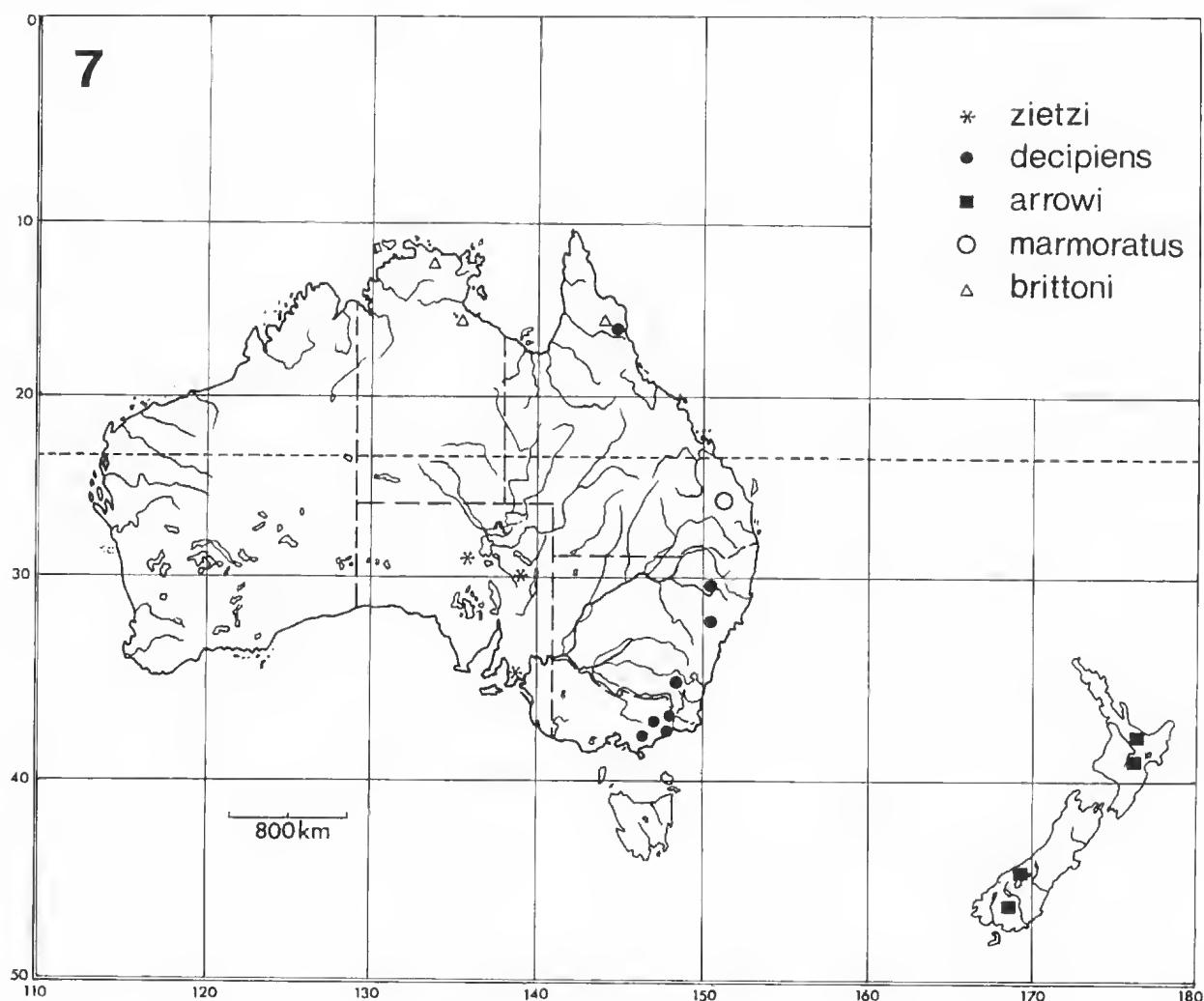


Fig. 7—Geographical distribution of *Laccobius zietzi*, *decipiens*, *arrowi*, *marmoratus*, and *brittoni*.

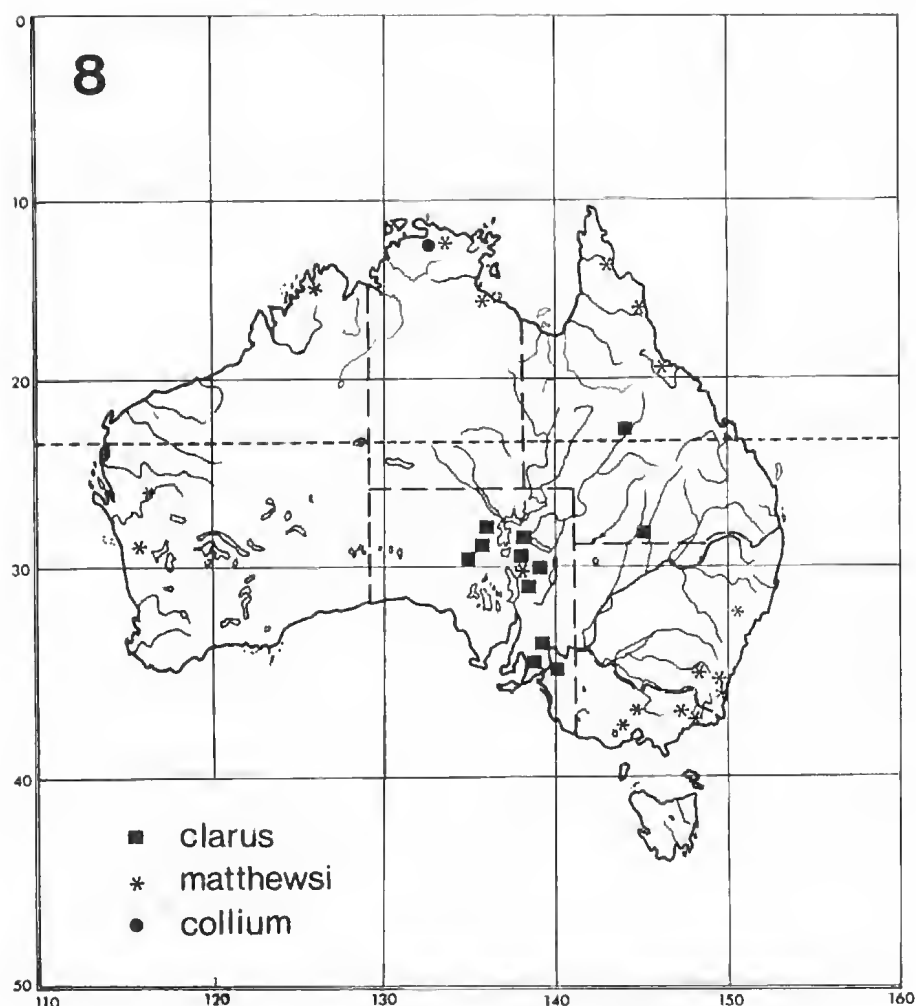


Fig. 8—Geographical distribution of *Laccobius clarus*, *matthewsi*, and *collium*.

Mr. G. A. Holloway, The Australian Museum, Sydney.

Dr. D. H. Kavanaugh, California Academy of Sciences, San Francisco.

Dr. J. Krikken, Rijksmuseum van Natuurlijke Historie, Leiden.

Dr. M. Pearce, Museum of Comparative Zoology, Harvard University, Cambridge, Mass.

Dr. G. A. Samuelson, Bernice P. Bishop Museum, Honolulu.

Dr. M. Winterbourn, University of Canterbury, Christchurch.

Dr. K. A. J. Wise, Auckland Institute and Museum, Auckland.

Special thanks also to Mr. A. Bertocchi, who prepared the drawings.

REFERENCES

- BALFOUR-BROWNE, J. 1939. Contribution to the study of the Palpicornia, II. *Ent. Month. Mag.* 75: 5-6.
- BLACKBURN, T. 1891. Further notes on Australian Coleoptera, with descriptions of new Genera and Species. *Trans. R. Soc. S. Austr.* 14, (1): 67-68.
- 1895. Further notes on Australian Coleoptera, with descriptions of new Genera and Species. *Trans. R. Soc. S. Austr.* 19 (1): 20-73.
- BRITTON, E. B. 1970. Coleoptera (Beetles) In: Waterhouse D. F. et al. "The Insects of Australia" (Melbourne University Press, Melbourne).
- GANGLBAUER, L. 1904. "Die Käfer von Mitteleuropa", IV, 251, note. (Goecke & Evers, Krefeld).
- GENTILI, E. 1974. Descrizione di nuove entità appartenenti al genere *Laccobius* Erichson, 1837 e proposta per un nuovo inquadramento sottogenerico. *Mem. Mus. Civ. St. Nat. Verona* 20 (1972): 549-550, 1 fig.
- GENTILI, E., and CHIESA, A. 1975. Revisione dei *Laccobius* palcarctici. *Mem. Soc. Ent. It.* 54: 6-22.
- KNISCH, A. 1924. *Hydrophilidae*. In: Junk, W., *Coleopterorum Catalogus*: 181-192 (W. Junk, Berlin).
- MACLEAY, W. 1873. Notes on a collection of Insects from Gayndah. *Trans. Ent. Soc. N.S. Wales* 2: 130-131.
- ORCHYMONT, A. d'. 1925. Contribution a l'étude des Hydrophilides, I. *Bull. Ann. Soc. Ent. Belg.* 65: 66-70.
- ORCHYMONT, A. d'. 1937. Check list of the Palpicornia of Oceania, Occas. Papers Bern. P. Bishop Mus. Honolulu 13: 13, 153.
- ORCHYMONT, A. d'. 1942. Contribution a l'étude de la tribu Hydrobiini Bedel. *Mem. Mus. R. Hist. Nat. Belg.* 11, 24: 3-10, 39.
- ORCHYMONT, A. d'. 1948. Report on the Palpicornia, Mr. Omer-Cooper's Investigation of the Abyssinian Fresh Waters (Hugh Scott Expedition). *Proc. Zool. Soc. London* 117: 727-728.
- WINTERBOURN, M. J. 1970. The Hydrophilidae of New Zealand's Thermal Waters. *Trans. R. Soc. New Zealand* 12: 21-28. 11 figs.
- WINTERBOURN, M. J. 1973. The larva of *Anacaena tepida* from a Rotorua Hot Spring. *New Zealand Ent.* 5: 171-174, 1 fig.
- WISE, K. A. 1973. A list and Bibliography of the aquatic and water-associated insects of New Zealand. *Rec. Auckland Inst. Mus.* 10: 156.
- ZAITZEV, P. 1908. Catalogue des Coléoptères aquatiques des familles des Dryopidae, Georyssidae, Cyathoceridae, Heteroceridae et Hydrophilidae. *Horae Soc. Ent. Rossicae* 38: 391-395.